QUESTIONS AND DISCUSSIONS.

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DISCUSSIONS.

In our last number, Professor Rees gave an instance of the use of vectors in connection with a problem in dynamics. In the first discussion below he indicates how the vector notation may be used to attack several questions in elementary geometry. It cannot be said that the proofs are much shorter than the usual ones; but the elegance of the vector formulation is obvious.

In an article in this department last October, devoted to the application of the theory of probability to various questions connected with the game of "craps," Mr. B. H. Brown gave the following theorem: *In any series of games where the probability of winning is constantly p, the average number of games won, up to and including the first lost game, is the reciprocal of the probability of losing.* He used this theorem to determine the average number of "rolls" required to complete a game. His proof, although relatively simple, involved the summation of the power series for $(1 - p)^{-2}$. In the second discussion this month Miss Charlotte Dickson gives an immediately obvious proof of the theorem. While the wording is phrased with reference to Mr. Brown's particular application, the work clearly holds for the general theorem.

Professor Frumveller contributes an "experience" article on the teaching of logarithms, suggested by the paper of Professor McClenon in the September MONTHLY. Like many articles on methods of teaching, its value lies not so much in the presentation of new pedagogical ideas as in recommendations concerning the distribution of emphasis. All teachers who are not committed to pure formalism will agree that equivalence of the logarithmic and exponential relationships, $y = \log_b x$, $x = b^y$ must be presented as the very soul of the theory of logarithms. With regard to Professor Frumveller's discussion of the difficulties associated with the negative characteristic, it is fair to state that none of the objections rightfully made to the notation -3.93817 can be extended to the notation $\bar{3}.93817$, which may legitimately be understood to mean $-3 + 0.93817$. Professor Frumveller closes his discussion by answering the query, for this kind of problem, when the wrong method can give the right result. The answer involves an elementary notion of number-theory.

Mr. C. N. Schmall in the closing discussion gives an illustration of the study of geometric questions by analytic methods. Sometimes the view is expressed that Cartesian coördinates should be introduced into the course in geometry in the secondary schools—after proofs of theorems on parallels and perpendiculars have made this logically possible—and used for certain demonstrations in lieu of the Euclidean tools. If such a procedure is to be seriously considered, it is desirable to produce instances in which analytic proofs are preferable. Can our readers supply a few such cases?